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AUTHOR Anderson, Richard C.; And Others
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ABSTRACT

Previous research has shown that adults tend to narrow the meanings of words encountered in context, a process that has been termed instantiation. In the present study, 60 first and fourth graders selected pictures which best represented the meanings of sentences read to them. The sets of pictures included three examples of a target word in each sentence, one of which best fit the meaning of the sentence as a whole. The children selected the contextually most appropriate picture over 90% of the time. The results indicate that the children were instantiating the target words with specific concepts rather than bringing to mind abstract, undifferentiated meanings. (Author)

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Technical Report No. 46

INSTANTIATION OF WORD MEANINGS IN CHILDREN

Richard C. Anderson, Kathleen C. Stevens,
Zohara Shifrin, and Jean H. Osborn

University of Illinois at Urbana-Champaign

May 1977

University of Illinois
at Urbana-Champaign
1005 West Nevada Street
Urbana, Illinois 61801

Bolt Beranek and Newman Inc.
50 Moulton Street
Cambridge, Massachusetts 02138

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Abstract

Previous research has shown that adults tend to narrow the meanings of words encountered in context, a process that has been termed instantiation. In the present study, 60 first and fourth graders selected pictures which best represented the meanings of sentences read to them. The sets of pictures included three examples of a target word in each sentence, one of which best fit the meaning of the sentence as a whole. The children selected the contextually most appropriate picture over 90% of the time. The results indicate that the children were instantiating the target words with specific concepts rather than bringing to mind abstract, undifferentiated meanings.

Instantiation of Word Meanings in Children

Though our language contains a finite number of words, people are able to use the language to make infinitely many distinctions. This is possible because we employ context and our knowledge of the world to narrow the sense and reference of terms. It is readily apparent that context ordinarily permits a choice among categorically distinct meanings of words, as in ball, a round thing or, ball a formal dance. What is not so widely appreciated is that further refinement of meaning is required for full comprehension. Consider the sentence, O. J. Simpson caught the ball. A sports fan will know that this is a football, not simply a round thing. Theoretical analysis suggests that people generally construct mental representations for words in context that are richer and more detailed than dictionary definitions. We have termed this process instantiation (Anderson, Pichert, Goetz, Schallert, Stevens, & Trollip, 1976; Anderson & Shifrin, in press).

Empirical research indicates that adults do tend to instantiate terms encountered in discourse. Anderson and McGaw (1973) presented sentences containing general concrete nouns. To illustrate, one of the sentences was The clothing caught on the lock. Previous research has established that shirt is the most frequent associate of clothing, thus it was reasoned that the instantiation of clothing was most likely to be some sort of shirt. Also selected were two matched low associates of the general noun, one naming a case bearing a greater resemblance than the other to the predicted instantiation. In the case of clothing, the low associates were jacket and slacks. A jacket is more like a shirt than slacks are, thus it was

expected that jacket would make a better retrieval cue for the clothing sentence. This, in fact, was the case. The results suggested that people use exemplars to represent the meanings of nouns.

Anderson and Ortony (1975) investigated the influence of context on instantiation. After reading such sentences as The container held the apples or The container held the cola, subjects received basket and bottle as retrieval cues. Basket was a much more effective cue for the first sentence, bottle for the second sentence. This experiment, too, suggests that adults instantiate general terms. Anderson, Pichert, Goetz, Schallert, Stevens, and Trollip (1976) presented sentences like the following: The fish attacked the swimmer. Most people instantiate this fish as a shark. When the retrieval cues fish and shark were presented, the instantiated term shark, was a substantially better cue for recall than the term actually used, fish. It was concluded that an instantiation is integral to sentence comprehension and memory, and that the nature of the instantiation depends upon context.

Other research with adults (Gentner, 1975; Halff, Ortony, & Anderson, 1976; and Labov, 1973) also demonstrates that word meanings are context sensitive. For instance, Labov showed that concepts such as cup are very fuzzy, and depend upon context for resolution. Context enables people to focus the encoded representation of a word.

No research on instantiation in children has been done. When a child sees or hears a word, does he particularize it, or does an abstract meaning come to mind? Is instantiation in children the same as instantiation in adults?

Paris and Lindauer (1976) have done the only developmental study we have been able to locate that bears on instantiation. They presented sentences to children in which the tool that would be used to accomplish some action was obvious, for instance, The workman dug a hole in the ground. Sentences were presented to first, third and fifth graders, with the tool explicitly stated (for example, . . . with a shovel) or unstated. Then the names of the tools were presented as cues and the children were asked to recall each sentence. Fifth graders recalled almost as many sentences when the cue was implicit as when it was explicit. The explicit-implicit difference was much larger for third graders and larger still for first graders. Paris and Lindauer completed a second experiment in which first graders were asked to act out each sentence as it was presented. This brought recall with implicit cues up to the level observed with explicit cues. Apparently children as young as first graders can make inferences of the type required for instantiation, but evidently they do not always do so spontaneously.

The present experiment investigated whether children instantiate. When presented with an utterance containing truck, for example, do children think of an abstract undifferentiated truck, or do they instantiate in terms of a particular type of truck appropriate to the linguistic and extralinguistic context? Based on the analysis of the requirements of complete comprehension and on adult research, it is to be hoped that young children do instantiate. However, the findings of Paris and Lindauer may indicate that there is a developmental trend; that is, that older children may instantiate more readily than younger ones.

Method

Subjects. The subjects were sixty public elementary school children, thirty first graders and thirty fourth graders enrolled in a school in a midwestern town of 20,000.

Materials. Twenty pairs of sentences were developed. Both members of each pair contained a word whose instantiation depended upon the context. For example, one pair of sentences was, Sally looked at the clock in her bedroom, and Sally looked at the clock in her classroom. The complete list of sentences appears in Tables 1 and 2. Four line drawings were done for each pair of sentences. Two pictures represented the expected instantiations of the two sentences, one picture represented another possible instantiation of the term, and the fourth picture was a completely unrelated object which served as a distractor. For the clock sentences, the four pictures showed a typical electric alarm clock, a standard classroom-type wall clock, a grandfather clock and a sponge.

Insert Tables 1 and 2 about here

The pictures were drawn without context. For example, as can be seen in Figure 1, nothing in the picture of the alarm clock suggested a bedroom, and nothing in the drawing of the wall clock gave any clues that it was mounted in a classroom. The arrangement of the pictures in each set was determined by assigning at random without replacement one of the 4! possible arrangements. The pictures were mounted on cardboard, and laminated with plastic to prevent them from getting smudged with finger prints.

There were twenty sets of pictures for the main part of the experiment and two practice sets.

Insert Figure 1 about here

Procedure. The subjects were run individually. Each child was called out of the classroom in turn, and asked if s/he would like to play a game. The first set of practice pictures was held up (three types of scissors and a kettle), and the sentence The little child cut with the scissors was read to the child. The child was instructed to point to the picture that best fit the sentence. The second practice sentence was The bird perched in a cage.

The sentences were grouped into two blocks with one sentence from each pair in each block. Block order was counterbalanced; that is, half the subjects received the blocks in one order, half in the other. There was a different, unsystematic order of sentences within blocks for each child, which the experimenter produced by scrambling the picture sets before each presentation.

A test score was obtained for each child from the school files. For the first graders, the test was the ABC Reading Inventory. For the fourth graders, it was the Metropolitan Reading Achievement Test.

Results and Discussion

A mixed, three-way analysis of variance was done. The between-subjects factors were grade and ability (three levels within grade). The within-subjects factor was block position (first or second). There were no

significant main effects or interactions, for the simple reason that even the dullest first graders generally chose the contextually appropriate picture. Overall, the first graders picked the expected picture 91.7% of the time and the fourth graders did so 96.7% of the time.

The logic of the experiment was that if the child were encoding an undifferentiated sense for a target word s/he would be equally likely to pick any of the pictured examples. If this were so, the hit rate would have been about 33% since there were three examples for each target word. It is clear, therefore, that the children were not simply bringing to mind abstract concepts but were instantiating specific concepts for the target words.

The evidence seems incontestible that the children were engaging in a process of instantiation. Attempts to explain away the results with arguments along the lines that some of the drawings were more attractive for some reason will not work, since the drawing that was appropriate in the context of one sentence was inappropriate in the context of the companion sentence from that pair.

The few cases where children failed to choose the contextually most appropriate drawings seem to be attributable to specific deficits in background knowledge, poorly designed stimulus materials, or idiosyncratic interpretation based on atypical personal experience. Tables 1 and 2 present the sentences and the percentages of the children selecting the expected picture. The two sentences containing the same target word are identified with the same number in the two tables.

Two pairs elicited considerably poorer performance from both the first and the fourth graders. Pair 4 consisted of The teacher sat at her desk and The student sat at her desk. The four pictures were of a school pupil's desk, an executive's desk, a wooden teacher's desk, and a cat. In retrospect, the drawings seem rather poor. There is very little difference between the executive's desk and the teacher's desk, except for a small phone on the corner of the former. In the line drawing, the difference between a steel and a wooden desk is not easily seen. Furthermore, some children seemed to make mistakes on this item because the teacher's desk apparently resembled study desks the students had at home. Several students, when picking the "teacher's desk" for The student sat at her desk commented that they had, in the words of one, "a desk just like that at home, where I do my homework."

Also troublesome was Pair 15, which consisted of the sentences, Joan saw a fish in the ocean and Joan saw a fish in the bowl. The pictures were a shark, a goldfish, a filet of fish, and a window. Some children put the goldfish in both the bowl and the ocean, saying of the shark picture, "That's a shark, not a fish." Others took "bowl" to mean a food bowl, and picked the filet.

Children's spontaneous comments during the experiment suggested that an instantiation process was going on. Sample remarks: "That looks like a Campbell's can" (Sentence 18, Block A); "The garbage men come to our house every Friday with a truck just like that" (Sentence 5, Block A); "My brother and I sleep in a bunk bed" (Sentence 7, Block B); "My momma

uses those in her hair" (Sentence 16, Block B). Children clearly used their world knowledge in reaching a choice of pictures. In most cases, the pointing was spontaneous and often accompanied by an expression of familiarity. Sometimes, children would comment on the items they did not pick: "Farmers don't wear bell bottoms" (Sentence 9, Block B); "That one's a girl's bike" (a picture accompanying Sentence 17, Block B); "A family couldn't fit in that car!" (sports car, accompanying Sentence 8, Block A).

The instantiation process was evident throughout. Even errors generally seemed to involve instantiation. One sentence (Sentence 20, Block B) read, The teacher wore a dress. The pictures were a tutu, a woman's suit, a long gown, and a tractor. The expected instantiation was, of course, the suit. However, several first graders were in a class taught by a woman who generally (we later found out) wears long dresses to school. A number of children registered confusion when presented with this item. While most of them did pick the suit, several picked the long gown, commenting, "Miss _____ always wears long dresses to school." The lone choice of the unrelated distractor in the experiment occurred when the sentence, He painted the picture with a brush, was read. The pictures presented were a paintbrush, an artist's brush, a hair brush, and a tree. The first-grade boy who made this error responded eagerly, "I love to paint trees," and pointed to the tree.

The experiment indicates that children are very sensitive to context in discourse. Like adults, they apparently narrow the reference of a word to a particular instance or subset of instances. Rather than having a

fixed, abstract meaning, words seem to assume different meanings for children depending on the context. This context, in turn, is augmented by the child from his or her knowledge of the world. For example, automobiles are a familiar part of almost every child's world. Not one child put a policeman in a station wagon, a family in a police car (distinguished only by the light on top of the car), or either in a sports car. This hardly argues for a fixed, abstract meaning of the word car, but rather, a highly differentiated meaning depending upon context. Yet a child who does not have this world knowledge about cars (say, a New Guinean child) would probably not be able to perform so successfully on this item.

The process of instantiation in children seems to be very similar to the adult process. The chief difference lies in the world knowledge possessed by the adult vis a vis the child. For example, many adults could probably instantiate the dresses referred to in the following sentences: Eleanor Roosevelt wore a dress, and Queen Nefertiti wore a dress, because they have some knowledge of these two women. Probably, most young children would not be able to do so, because of inadequate world knowledge (and thus the sentences would not mean as much to the child). On the other hand, because of pervasive effects of TV, children probably would be able to meaningfully instantiate Cher wore a dress, and the sentence would carry great meaning for them.

While the present study surely demonstrates that children can draw inferences of instantiation, it may give an overly optimistic picture of the likelihood that they will draw them in ordinary classroom language

activities. There is considerable evidence that young children do not spontaneously engage in inferential elaboration (Brown, 1975; Anderson & Shifrin, in press). In our experiment, the pictures may have helped guide the child's thinking, suggesting instantiations that would not otherwise have occurred to him or her. Furthermore, the task may have kept the child actively engaged in semantic processing. Finally, in this experiment the sentences were presented orally. It remains to be seen whether children, especially ones who are poor readers, would always instantiate the words in written sentences, since they would be devoting attention to the decoding aspects of the task, and some may believe that arriving at a correct pronunciation is more important than a deep analysis of meaning.

Teachers probably should assist children by supplying helpful context, drawing available context to the children's attention, and encouraging them to bring to bear their world knowledge. Toward this end, teachers might have children act out sentences, discuss what they've read, or supply pictures to provide more context. However, children will obviously have to be weaned from these crutches at some time if they are to become successful readers. Thus, teachers need to insure that the child continues to make inferences of instantiation when the aids are withdrawn (Campione & Brown, 1976).

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Table 1

Percentages of Contextually Appropriate Choices, Block A

		First Grade	Fourth Grade
1.	John wore a shirt when he went out to play.	97	100
2.	Kevin wore new shoes to play baseball.	97	93
3.	Sally looked at the clock in her bedroom.	90	100
4.	The teacher sat at her desk.	57	77
5.	The men picked up the garbage in a truck.	97	100
6.	The football player threw the ball.	97	97
7.	The parents slept in the bed.	100	100
8.	The policeman rode in a car.	100	100
9.	The secretary wore a pair of pants to work.	93	100
10.	The fisherman rode in a boat.	83	90
11.	The butter was on a plate.	90	97
12.	I washed my hands in the sink in the kitchen.	97	90
13.	The lady wore a coat in the winter.	100	100
14.	This building is a nice place to shop.	100	100
15.	Joan saw a fish in the ocean.	60	67
16.	The pin was in the baby's diaper.	100	100
17.	The little boy owns a bicycle.	97	100
18.	Soup comes in a can.	100	100
19.	He painted the house with a brush.	93	100
20.	The dancer wore a dress.	90	97

Table 2

Percentages of Contextually Appropriate Choices, Block B

		First Grade	Fourth Grade
1.	John wore a shirt when he went to church.	90	97
2.	Kevin wore new shoes to play in the snow.	87	97
3.	Sally looked at the clock in her classroom.	87	100
4.	The student sat at her desk.	80	90
5.	The men picked up the furniture in a truck.	97	94
6.	The basketball player threw the ball.	100	100
7.	The brothers slept in the bed.	94	94
8.	The family rode in the car.	100	100
9.	The farmer wore a pair of pants to work.	94	100
10.	The captain rode in a boat.	94	100
11.	The turkey was on the plate.	97	100
12.	I washed my hands in the sink in the bathroom.	100	100
13.	The lady wore a coat in the rain.	100	100
14.	This building is a nice place to live.	94	100
15.	Joan saw the fish in the bowl.	87	100
16.	The pin was in the lady's hair.	97	100
17.	The big boy owns a bicycle.	74	97
18.	Paint comes in a can.	100	100
19.	He painted the picture with a brush.	84	100
20.	The teacher wore a dress.	80	94

Figure Caption

Figure 1. Pictures for clock sentences.

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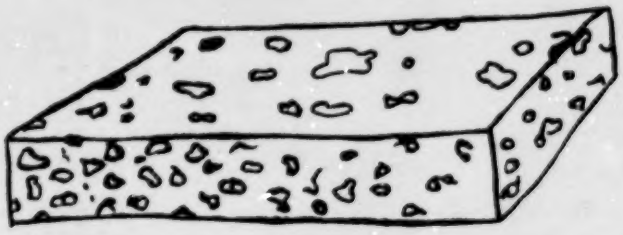

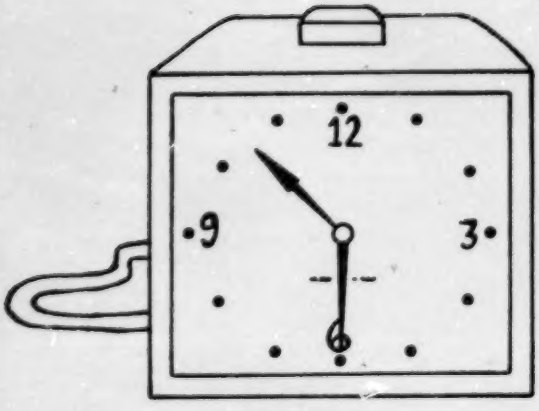
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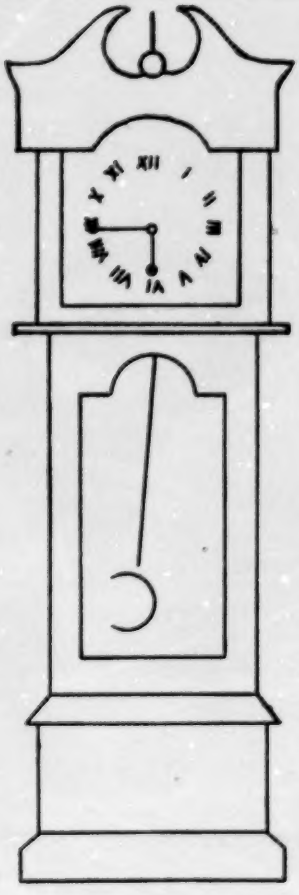

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